

Ward, M. 2005 “Integrated Status and Effectiveness Monitoring Program: Wenatchee and Entiat Subbasins. An experimental application of the Upper Columbia Monitoring Strategy.” CBFWA RME Workshop 7.21.2005

Project funders

Bonneville Power Administration
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Cooperators

U.S. Fish and Wildlife Service
U. S. Forest Service – Wenatchee/Okanogan National Forest
U. S. Forest Service – Wenatchee Forestry Science Lab
University of Alaska – Fairbanks
Washington Department of Fish and Wildlife
Washington Department of Ecology
Yakama Nation
Chelan Conservation District
Pacific Biodiversity Institute
BioAnalysts, Inc.
Terraqua, Inc.

Technical Oversight

Upper Columbia Regional Technical Team

Three Types of Monitoring Considered within ISEMP

The implementation of monitoring activities in the Wenatchee Subbasin is organized by the three levels of monitoring considered in Jordan (2003) and Hillman (2004):

1. Status Monitoring: A description of the current conditions.
2. Trend Monitoring: An analysis of how conditions change over time.
3. Effectiveness Monitoring: An analysis of how restoration actions affect fish populations and habitat conditions.

Multiple Spatial and Temporal Scales

<u>Space</u>	<u>Time</u>
Basin	Decadal
Subbasin	Sub-decadal
Watershed	Annual
Reach	Seasonal
Site/Project	Monthly
Transect/Plot	Weekly
Individual/Microhabitat	Diurnal
	Hourly

Indicators???

Example 1:

Site Selection for Habitat and Snorkel Surveys

2004 Annual Panel (Initial attempt at sampling design)

Multi-Density Categories: Five categories based on stream gradient: [0,2], (2,4], (4, 8], and (8, 12] and Strahler order.

	[0,2]14	[0,2]5	(2,4]	(4, 8]	(8, 12]
Sample Size:	41.5%	4.5%	25%	20%	10%

Concerns:

Over represent 1st order/fish-less areas

Under represent anadromous sites

Under represent snorkelable sites

Over represent sites unsuitable for habitat protocols

2005-2009 Annual and Rotating Panels

Fish Type	Strahler	Annual Panel	2005 Panel	Percent	
anadromous	1	2	2	8%	
anadromous	2	4	4	16%	
anadromous	3	5	5	20%	
anadromous	4	5	5	20%	
anadromous	5	2	2	8%	
resident	1		4	4	16%
resident	2		2	2	8%
resident	3		1	1	4%
resident	4		0	0	0%
resident	5		0	0	0%

Example 2:

Temporal Variability in Snorkel Surveys

Daytime versus Nighttime (50 sites sampled night and day)

Daily Variability (3 sites sampled on 24 hour interval)

Weekly Variability (3 sites sampled on 7 day interval)

Monthly Variability (3 sites sampled on 4 week interval)

Example 3:

Coordination

Site Reconnaissance (USFS, CCCD)

Habitat (WDOE)

Snorkel (USFS)

Repeat Sampling (Terraqua, Inc.)

Project Effectiveness Experiment in Entiat Subbasin

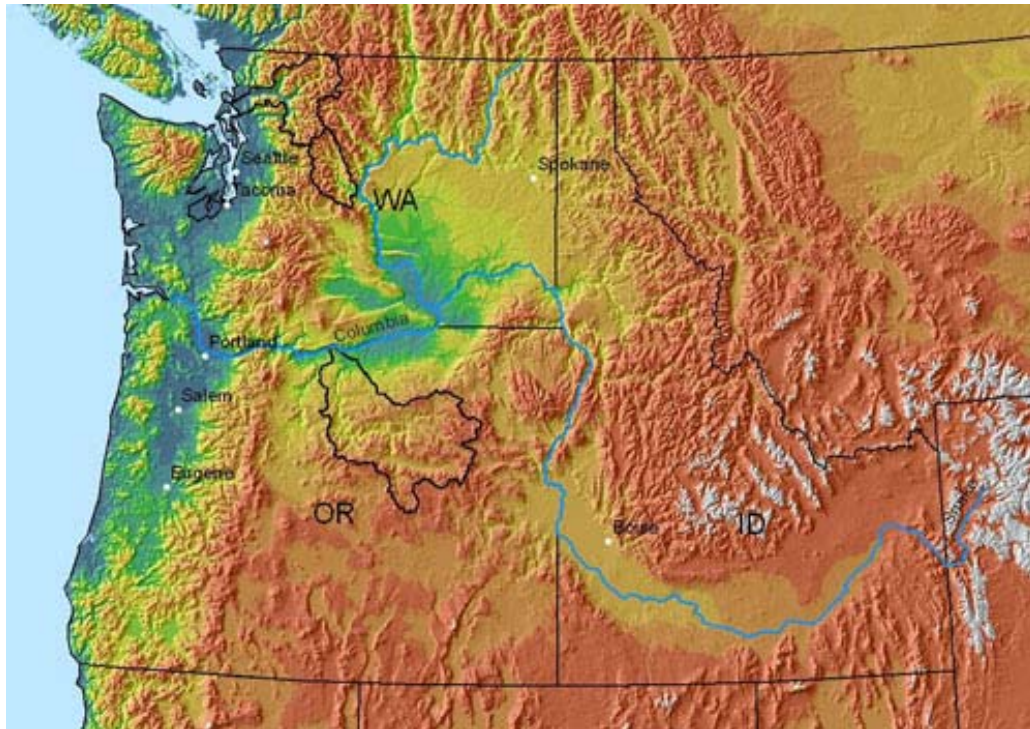
3 treatment sites

3 pre-existing treatment sites

3 untreated control sites

Snorkel, habitat surveys, other on-going monitoring

Figure



Figure

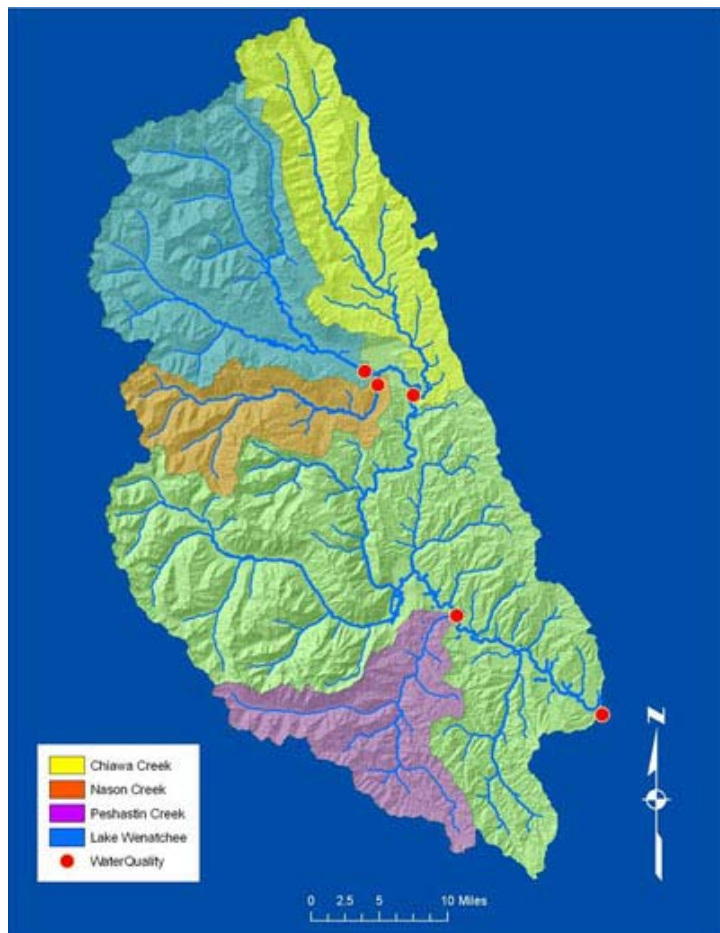
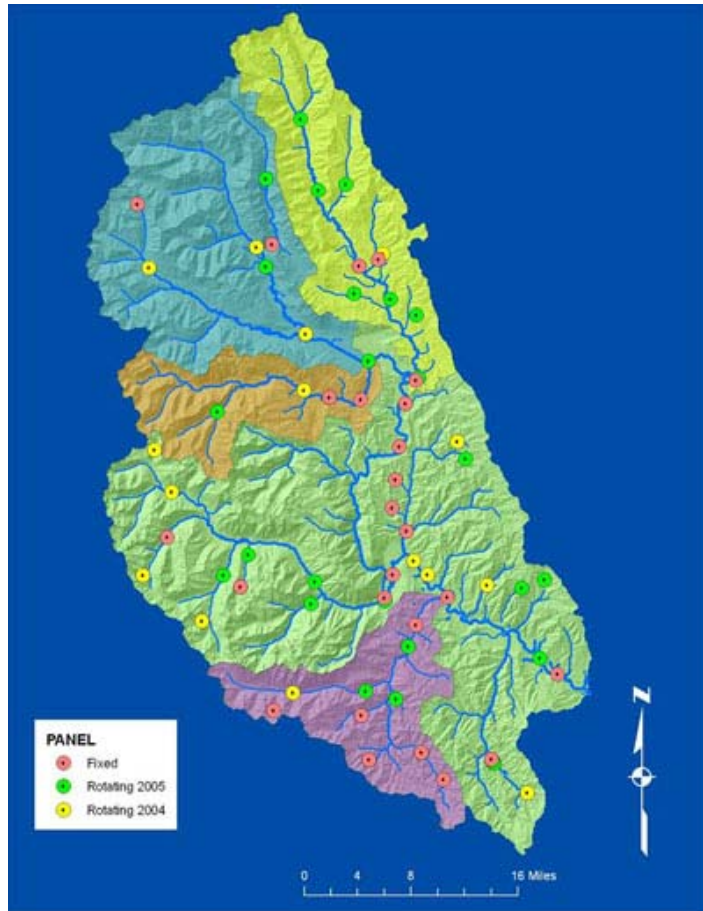
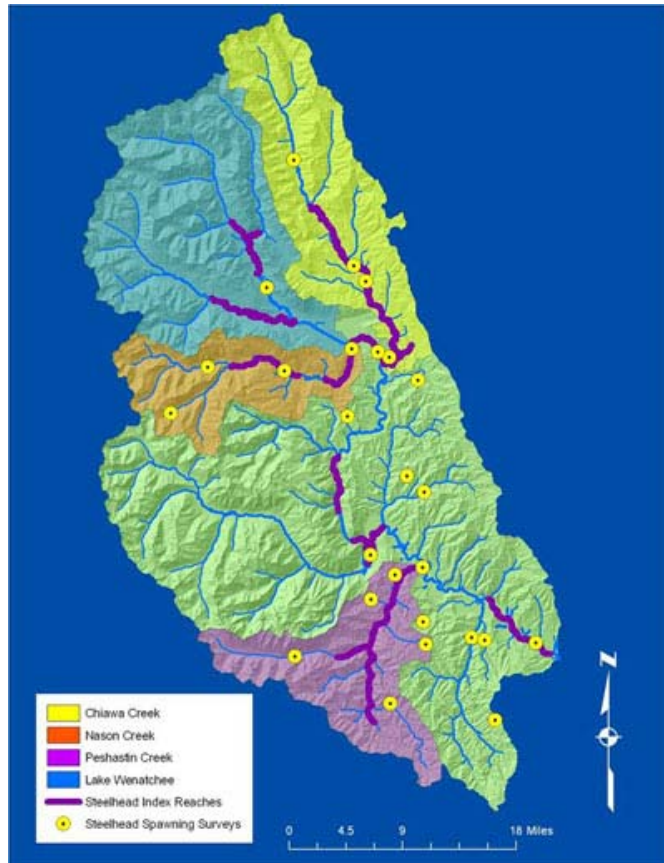


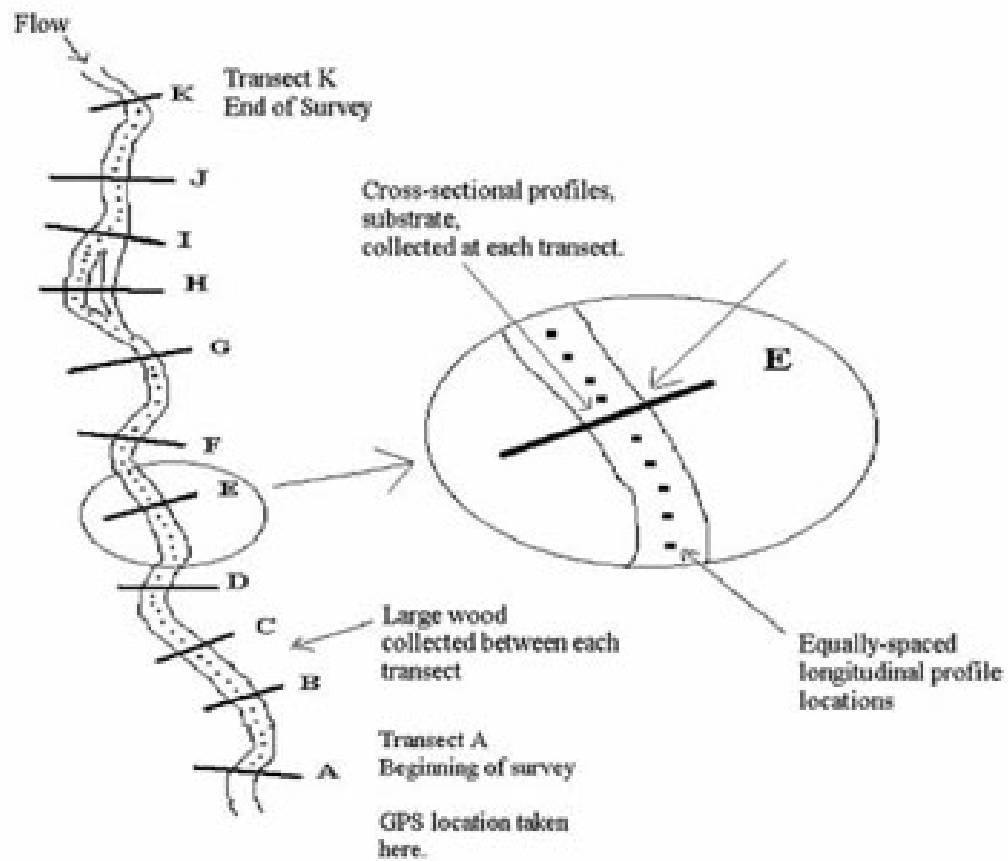
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